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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/098,501	03/18/2002	Kensaku Motoki	33035M091	4431

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EXAMINER

ANDERSON, MATTHEW A

ART UNIT

PAPER NUMBER

1765

DATE MAILED: 09/15/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/098,501

Applicant(s)

MOTOKI ET AL.

Examiner

Matthew A. Anderson

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 26 June 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) 11-20 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☐ Claim(s) 1-10 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 18 March 2002 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 3. 6) ☐ Other: _____

DETAILED ACTION

Election/Restrictions

1. Applicant's election without traverse of Group I, claims 1-10 in Paper No. 5 is acknowledged.
2. Claims 11-20 are withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected Group II, there being no allowable generic or linking claim. Election was made **without** traverse in Paper No. 5.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 1- are rejected under 35 U.S.C. 103(a) as being unpatentable over Horino et al. (US 6,072,197) in view of Tanaka et al.(US 5,909,036).

Horino et al. discloses the method of forming single crystal light emitting devices with the wurzite structure such as GaN (col.1 lines 5-15). The substrate for growth can be the hexagonal sapphire crystal or GaN with the {1-100} or the {11-20} planes used as the principle plane of the crystal substrate (col. 5 lines 50-60). Conventionally, the sapphire c-plane (equivalently, the {0001} plane) was used as the substrate for GaN

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single crystal growth (col. 2 lines 15-20). In col. 10 lines 40+ and col. 11 lines 1-30 the planes and their relations are explained. The symmetry and anisotropy of these planes is described. Methods of growing GaN and its alloys by metal organic gas precursor decomposition (i.e. MOCVD) on a GaN substrate are described in col. 11 lines 30+ to col. 13 line 25. In col. Lines 8-9, the substrate is described as variable in principle plane and in material composition. P-type and N-type doping is described for GaN and its alloys. Fig. 5A shows a faceted structure formed from a {0001} GaN (i.e. a c-plane) (col. 15 third example). The facet is of the {11-21} variety. The facet plane is described as not limited in line 48.

Horino et al. does not describe the use of oxygen to dope GaN materials.

Tanaka et al. discloses the growth of III-V nitride semiconductors including GaN and its alloys (see abstract). MOCVD is described in col. 7 as a suitable method of forming these materials. Doping of these materials is described as accomplished by adding impurities in col. 8 lines 15-28. N-type nitrides are formed by adding oxygen to the nitride. Addition of the doping gas during growth is suggested in col. 9 lines 35-45.

It would have been obvious to one of ordinary skill in the art at the time of the present invention to combine the references because Tanaka et al. discloses known alternative methods of doping GaN and its alloys. Motivation would be found in that oxygen was plentiful, would have expanded the flexibility of the process, and was known to successfully dope GaN.

In respect to claims 1-5, it would have been obvious to one of ordinary skill in the art at the time of the present invention to form oxygen doped GaN single crystals by

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using a non-C plane GaN substrate as claimed and supplying precursor gases and oxygen dopant to grow the oxygen doped GaN material on the substrate because such is suggested by the combination above. The examiner notes the disclosed {1-100} and {11-20} planes read on the claimed planes in claims 2 and 3.

In respect to claims 6-7, 9, it would have been obvious to one of ordinary skill in the art at the time of the present invention to form oxygen doped GaN single crystals by using a C plane faceted GaN substrate as claimed and supplying precursor gases and oxygen dopant to grow the oxygen doped GaN material on the faceted substrate because such is suggested by the combination above. The examiner notes the disclosed {11-21} facet plane reads on the claimed plane in claim 7.

5. Claims 8, 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Horino and Tanaka et al. as applied to the above claims, and further in view of Tomiya et al. (US 6,576,533 B2).

Horino and Tanaka et al. combined are described above.

The combination does not disclose using a facet plane of {1-101}.

Tomiya et al. discloses the method of forming faceted nitride semiconductors. (abstract). In col. 9 lines 55-65, facet planes of {1-101} are disclosed.

It would have been obvious to one of ordinary skill in the art at the time of the present invention to combine the facet plane of Tomiya et al. with the Horino/Tanaka et al. combination because Horino et al. suggests other facet planes for growth. Motivation is found in the different facet plane allows further process flexibility.

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In respect to claims 8, 10, it would have been obvious to one of ordinary skill in the art at the time of the present invention to form oxygen doped GaN single crystals by using a C plane faceted GaN substrate as claimed and supplying precursor gases and oxygen dopant to grow the oxygen doped GaN material on the faceted substrate because such is suggested by the combination above. The examiner notes the disclosed {1-101} facet plane reads on the claimed plane in claim 8.


Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Matthew A. Anderson whose telephone number is (703) 308-0086. The examiner can normally be reached on M-Th, 6:30-5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nadine Norton can be reached on (703) 305-2667. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 872-9306 for regular communications and (703) 872-9306 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0661.

MAA
September 9, 2003


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